

Microwave ovens - safety issues

The microwave oven is a versatile, time saving kitchen appliance that uses microwave radiation to heat food. Food cooked in the microwave is as nutritious as food cooked in other ways, and research suggests that microwave cooking retains more vitamins, minerals and nutrients than boiling.

However, the microwave oven can be dangerous if it is not used correctly. Common dangers include unevenly cooked foods and scalds from escaping steam. A microwave oven should not be used to sterilise jars or bottles, including babies' bottles.

Microwave radiation explained

The electromagnetic (EM) radiation spectrum is the collective term for all the different types of electrical energy and their associated electrical and magnetic fields that spread out through space. Examples include microwaves, visible light, x-rays, radio waves and ultraviolet light.

Energy types are graded on the EM spectrum according to how much energy they produce, which is indicated by their wavelength. The shorter the wavelength, the higher the energy. Radio waves are the longest, X-rays and gamma rays are the shortest. Microwaves have longer wavelengths than infrared radiation and visible light, but are shorter than those of the VHF and UHF broadcasting bands.

Microwaves are transmitted, reflected or absorbed by objects, depending on what the objects are made of. Microwaves pass through glass and plastic, bounce off some metals, and are absorbed by any object that contains water. All foods contain varying degrees of moisture, no matter how dry they look. Heat is produced as the microwaves agitate the water molecules contained within the food.

Advantages of the microwave oven

Some advantages of using the microwave oven include:

- It is faster than conventional methods of cooking.
- Conventional methods of cooking use energy to heat oil, water or air - microwave ovens only heat the food, so you can save on your energy bills.
- Nutrients are retained in the food.
- Protein foods don't brown when cooked in a microwave. This reduced oxidation means that nutrients like vitamin A and E are less likely to be destroyed.
- Food heated quickly in a microwave retains more nutrients than foods kept hot for a long time, such as those simmered on a stove.
- Potentially dangerous micro-organisms in food tend to thrive in temperatures between 5°C and 60°C. When you use a microwave oven, food can be thawed, cooked and served quickly. So it spends less time in the dangerous temperature zone.

Common misconceptions

There are many misconceptions about microwave ovens, including:

- **Microwave energy changes the chemical composition of food** - not true. The only changes experienced are those caused by fast cooking. There is no evidence of poisonous or dangerous compounds created by microwave energy.
- **Eating food cooked in the microwave exposes you to radiation** - not true. As soon as the oven is switched off, there are no longer any microwaves in the oven or the food.
- **Microwave energy is radioactive** - not true. Microwave energy can't make the oven, food or anything else radioactive. Extensive research has provided no conclusive evidence that microwave exposure, at any level, either causes or promotes cancer.

Radiation leaks

Exposure to high levels of microwave radiation is known to cause health problems including cataracts and burns. Radiation leaks from a microwave oven are possible if the oven door is damaged or doesn't seal properly.

In most cases, the leaks are too small to cause a significant health risk, according to the National Health and Medical Research Council. If your microwave is in good condition and is used according to the manufacturer's instructions, it is safe. However, safety suggestions include:

- Regularly check the door of your microwave oven for corrosion or damage, and that it fits securely.
- Never tamper with or inactivate the interlocking devices. These are designed to stop the production of microwaves the moment the latch is released or the door opened.
- Clean the oven regularly to make sure that burnt food isn't stuck to the interior and door.
- Don't run the microwave oven when it's empty.
- If you are concerned, have your microwave oven tested for leaks at an appropriate repair shop.

Food is cooked unevenly

The major drawback of the microwave oven is that food doesn't heat evenly, which means there are cold spots and hot spots. Bacteria and other micro-organisms can thrive in the cold spots.

Suggestions include:

- Make sure that frozen foods are properly thawed in the microwave before cooking, because cold spots may allow bacteria levels to rise.
- Thorough cooking is more likely if you chop the food into similar sized chunks. Smaller portions cook more evenly than large portions.
- The use of cooking bags and lids, or covering the container with plastic film, helps ensure even cooking and destruction of harmful bacteria.
- Ensure a more even temperature by using shallow and round containers, rather than square and high-topped containers.
- Stir food at least once during the cooking process.
- Foods that can't be stirred (such as roasts or quiches) should be left to stand, so that the heat can penetrate more evenly throughout.
- Observe recommended standing times on microwave food products, such as popcorn or pre-packaged meals.
- Avoid cooking stuffed poultry, as it is hard to ensure the stuffing has reached a temperature high enough to kill harmful bacteria.

Avoid burns

Foods cooked in microwave ovens can cause burns in many different ways. For example, you may lift the plastic film from a plate and be scalded by escaping steam, or you may burn your mouth because you didn't expect to find boiling hot jam inside a lukewarm donut.

Suggestions include:

- Don't heat baby bottles of milk in the microwave. The contents may be dangerously hot, even if the bottle feels to be at a safe temperature.
- If you are using a container in the microwave for the first time and aren't sure if it's microwave-safe, remove it wearing oven gloves. Some containers may heat up enough to burn bare skin.
- Microwave-safe plastic wrap should be used loosely so that steam can escape - don't stick it down drum-tight.
- When opening bags or lifting plastic film, point the opening away from you.
- Be especially careful with foods that have distinct outer and inner layers - for example jam donuts, meat pies, pasties and so on. The outer layer may be just warm, but the interior could be boiling hot. Instead of taking a bite (and possibly burning your mouth), cut the food in half and check the filling for steam.
- Don't cook an egg within its shell. The build-up of steam will explode the egg.
- Liquids or foods can be 'super-heated', which means they may boil explosively when stirred or otherwise disturbed. Always observe recommended cooking times. If you're unsure of how long to cook a particular food or liquid, leave it to cool in the microwave oven before taking it out.

A microwave oven is not a steriliser

A microwave oven cannot be used to sterilise jars or bottles. Do not use a microwave oven to sterilise babies' bottles or glass jars and containers used to make jams or preserves. Glass bottles and jars can be sterilised in two ways:

- **Heat sterilised** - boiled in water for a minimum of 10 minutes.
- **Chemically sterilised** - immersed for 10 minutes in a chlorine solution at 100 to 200mg/L (for household bleach use 12.5 to 25ml per 5 litres of water).

General safety suggestions

Suggestions include:

- Read the microwave oven's instruction manual thoroughly. Keep it handy so that you can refer to it often.
- Only use microwave-safe containers. Glass or ceramic containers that aren't labelled 'microwave-safe' may overheat and cause burns.
- Never use plastic grocery bags, newspaper or plastic containers for frozen foods (such as ice-cream containers) in the microwave.
- Avoid using plastic containers or film unless the manufacturer explicitly states that these items are microwave safe. Otherwise, compounds from the heated plastic can leech into the food.
- Don't allow plastic film to touch the food. Even plastic labelled 'microwave safe' should not touch food to avoid migration of chemicals from the plastic.
- Use glass containers designed for microwaves to cook high-fat foods, as additives from plastic are more likely to migrate into fatty foods at high temperatures.
- Don't use metal containers or containers with metal trims.
- It may be possible to use aluminium foil but check your instruction manual. Usually you can use small amounts of aluminium foil (for example, to shield chicken wings from overcooking) as long as the foil doesn't touch the sides of the oven.
- Always supervise children when they use the microwave oven. Show them how to use it safely and warn them of the possible dangers.
- Consider buying an oven with a child safety lock.

Where to get help

- Instruction manual
- Manufacturer of your microwave oven
- Microwave oven repair shop
- Radiation Safety Program, Department of Human Services Tel. 1300 767 469
- Australian Radiation Protection and Nuclear Safety Agency Tel. 1800 022 333
- Food Safety Victoria Hotline Tel. 1300 364 352

Things to remember

- Food cooked in the microwave is about as nutritious as food cooked in other ways, and studies suggest that microwave cooking retains more vitamins, minerals and nutrients than boiling.
- In most cases, the radiation leaks from microwaves are too small to cause a significant health risk, unless there is obvious damage to the oven door.
- The major drawback of the microwave oven is that food doesn't heat evenly, and bacteria can thrive in the cold spots.

Want to know more?

Go to More information for support groups, related links and references.

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